UTAH DATA FOR THE 2014 UPDATE OF THE NATIONAL SEISMIC HAZARD MAPS

UTAH GEOLOGICAL SURVEY

U.S. Geological Survey
Intermountain West Workshop
Salt Lake City, Utah, June 13 and 14, 2012

UTAH PALEOSEISMOLOGY REPORTS 2007 TO PRESENT

- Fifteen investigations resulting in new paleoseismic information for Utah faults completed since 2007.
  - Eight investigations on the Wasatch fault
    - Levan and Fayette segments
    - Nephi segment (2)
    - Provo segment
    - Salt Lake City segment and West Valley fault zone
    - Weber segment
    - Brigham City segment
    - Collinston and Clarkston Mountain segments
  - Seven investigations on other Utah faults
    - Hurricane fault
    - Sevier fault
    - Joes Valley fault zone
    - Main Canyon fault
    - East Cache fault zone southern segment
    - Paunsaugunt fault
    - Washington fault northern section

Wasatch Fault Investigation References

1. Surficial-geologic reconnaissance and scarp profiling on the Collinston and Clarkston Mountain segments of the Wasatch fault zone, Box Elder County, Utah – paleoseismic inferences, implications for adjacent segments and issues for diffusion-equation scarp-age modeling – Paleoseismology of Utah, Volume 15, 2007, by Hylland, M.D.: Utah Geological Survey Special Study 121.
2. Paleoseismology of the Nephi segment of the Wasatch fault zone, Juab County, Utah – Preliminary results from two large exploratory trenches at Willow Creek, 2007, by Machette, M.N. and others: U.S. Geological Survey Scientific Investigation Map 2966.
3. Spatial and temporal patterns of surface faulting on the Levan and Fayette segments of the Wasatch fault zone, central Utah, from surficial geologic mapping and scarp-profile data, 2007, by Hylland, M.D.: Utah Geological Association Publication 36.
4. Paleoseismic investigation of the northern strand of the Nephi segment of the Wasatch fault zone at Santaquin, Utah – Paleoseismology of Utah, Volume 17, 2008, by DuRoss, C.B. and others: Utah Geological Survey Special Study 124.
5. Paleoseismic investigation of the northern Weber segment of the Wasatch fault zone at Rice Creek trench site, North Ogden, Utah – Paleoseismology of Utah, Volume 18, 2009, by DuRoss, C.B. and others: Utah Geological Survey Special Study 130.

Wasatch Fault Investigation References (continued)

6. Extending the paleoseismic record of the Provo segment of the Wasatch fault zone, Utah, 2011, by Olig, S.S. and others: USGS Final Technical Report Contract No. 02HQGR0109.

7. Paleoseismic investigation to compare surface faulting chronologies of the West Valley fault zone and Salt Lake City segment of the Wasatch fault zone, Salt Lake County, Utah, 2012, by DuRoss, C.B. and Hylland, M.D.: USGS Final Technical Report Contract No. G10AP00068.

8. Late Holocene earthquake history of the Brigham City segment of the Wasatch fault zone at the Hansen Canyon, Kotter Canyon, and Pearsons Canyon trench sites, Box Elder County, Utah, 2012, by DuRoss, C.B and others: Utah Geological Survey Special Study 142.

In Progress

Currently trenching the northern (Spring Lake site) and main (North Creek site) traces of the Nephi segment of the Wasatch fault zone to extend the paleoearthquake record to the mid/early Holocene.

Other Utah Fault References

1. Paleoseismic investigation and long-term slip history of the Hurricane fault in southwestern Utah – Paleoseismology of Utah, Volume 14, 2007, by Lund, W.R. and others: Utah Geological Survey Special Study 119.
2. Paleoseismic reconnaissance of the Sevier fault, Kane and Garfield Counties, Utah – Paleoseismology of Utah, Volume 16, 2008, by Lund, W.R. and others: Utah Geological Survey Special Study 122.
3. Evaluation of the seismogenic potential of the Joes Valley fault zone – Joes Valley Dam, Emery County Project, Utah, 2008, by Anderson, L.W.: U.S. Bureau of Reclamation Technical Memorandum No. 86-68321-2008-10.
4. Late Quaternary faulting in East Canyon Valley, Northern Utah – Paleoseismology of Utah, Volume 19, 2010, by Piety, L.A. and others: Utah Geological Survey Miscellaneous Publication 10-5.
5. Determination of paleoearthquake timing and magnitudes on the Southern segment of the East Cache fault, Utah, 2012, by Evans, J.P., and McCalpin, J.P.: USGS Final Technical Report Contract No. 07HQGR0079.

Other Utah Fault References
(continued)

6. Summary of preliminary investigations of the Paunsaugunt fault, Utah, 2012, prepared by RJH Consultants, Inc. for the Utah Quaternary Fault Parameters Working Group 2012 annual meeting.

7. Dutchman Draw paleoseismic investigation, Northern section Washington fault zone, Mohave County, Arizona, in preparation, by Lund, W.R. and others: Utah Geological Survey Special Study.

OTHER REPORTS OF POSSIBLE INTEREST

1. Surficial geologic map of the Levan and Fayette segments of the Wasatch fault zone, Juab and Sanpete Counties, Utah, 2008, by Hylland, M.D., and Machette, M.N.: Utah Geological Survey Map 229.

2. Surficial geologic map of the Salt Lake City segment and parts of adjacent segments of the Wasatch fault zone, Davis, Salt Lake, and Utah Counties, Utah, 2009, by Personius, S.F., and Scott, W.E., (digitized from U.S. Geological Survey Miscellaneous Investigations Series Map I-2106 [1992]): Utah Geological Survey Map 243DM.

3. Compilation of 1970s Woodward-Lundgren & Associates Wasatch fault investigation reports and oblique aerial photography, Wasatch Front and Cache Valley, Utah and Idaho, 2009, by Bowman, S.D. and others: Utah Geological Survey Open-File Report 548.

4. Compilation of U.S. Bureau of Reclamation seismotectonic studies in Utah, 1982-1999 – Paleoseismology of Utah, Volume 20, 2011, by Lund, W.R. and others: Utah Geological Survey Miscellaneous Publication 11-2.

5. Compilation of 1982-83 seismic safety investigation reports of eight SCS dams in southwestern Utah (Hurricane and Washington fault zones) and low-sun-angle aerial photography, Washington and Iron Counties, Utah, and Mohave County, Arizona – Paleoseismology of Utah, Volume 21, 2011, by Bowman, S.D. and others: Utah Geological Survey Open-File Report 583.

Utah Recommendations for the 2014 Update of the National Seismic Hazard Maps

1. Add new earthquake fault sources

   - Washington fault northern section – minimum of two Holocene surface faulting earthquakes, most recent closed-seismic-cycle slip rate of 0.11–0.29 mm/yr.

   - Main Canyon fault? (formerly East of East Canyon fault) – two surface-rupturing earthquakes during the past 30 to 38 ka (Piety and others, 2010). The most recent earthquake likely occurred shortly before 5 to 6 ka, but could be as old as 12 to 15 ka. Limited evidence for an unknown number of surface-rupturing earthquakes older than 38 ka. No displacement/slip-rate data.

2. Modify Probability of Activity and Probability of Independent Rupture for the West Valley fault zone to 1.0 and 0.5, respectively, and Probability of Activity for Joes Valley faults to 0.4.